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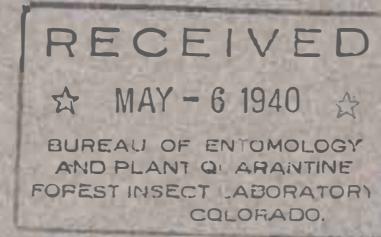
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TITLE

REPORT OF PINE-BEETLE SURVEYS
ON THE
SNOQUALMIE NATIONAL FOREST, WASHINGTON
SEASON OF 1939



Forest Insect Laboratory
445 U. S. Court House
Portland, Oregon

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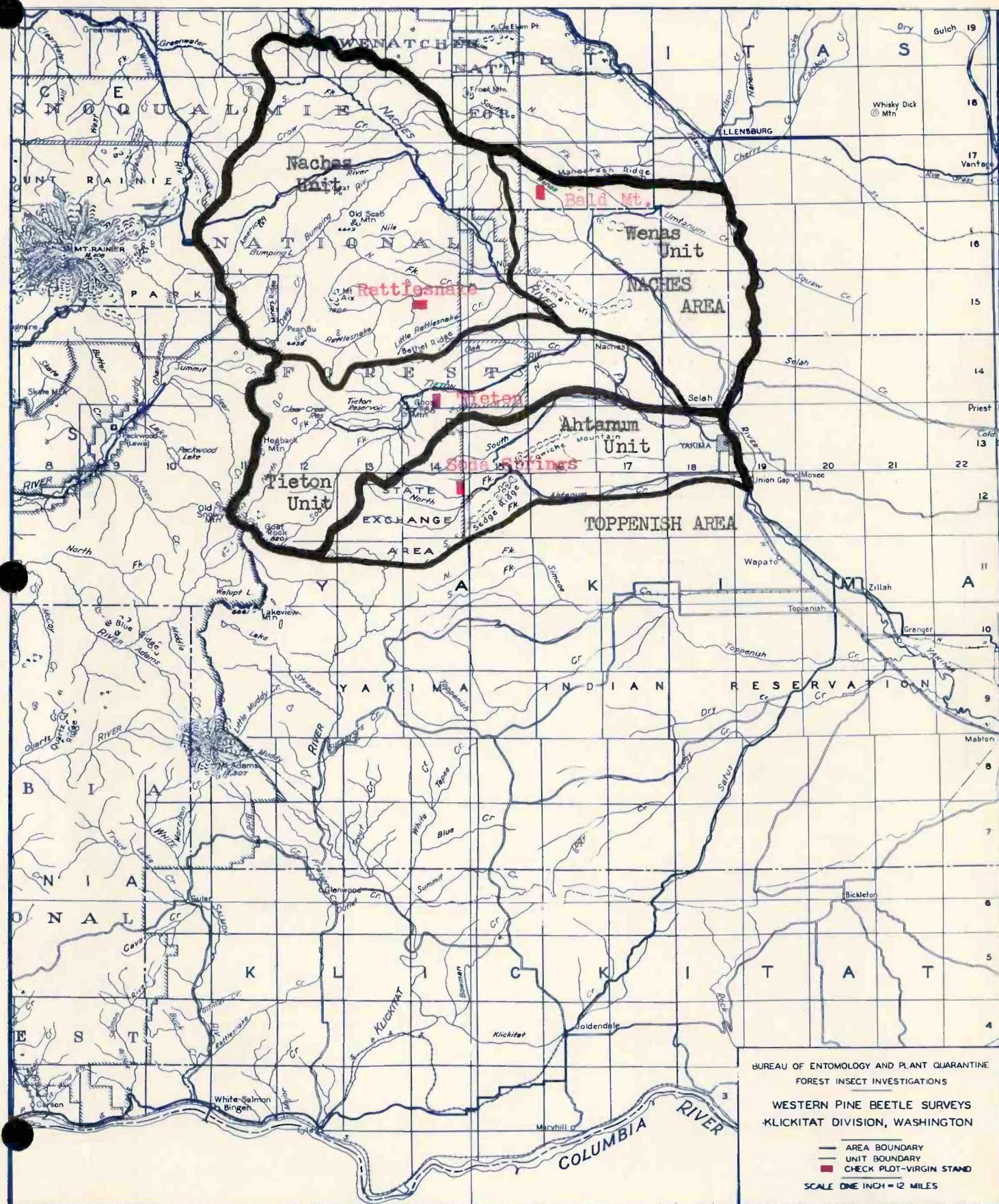
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Introduction.

Forest-insect activities in portions of the ponderosa pine stands of the Snoqualmie National Forest, Wash., east of the Cascade Mountains, have been followed since 1933 by surveys conducted cooperatively by the Forest Service and the Bureau of Entomology and Plant Quarantine. The sixth survey was completed during the summer of 1939. These surveys, part of a regional survey program, have three objectives: (1) To follow the infestation trends of a group of destructive bark beetles, collectively called "pine beetles", and primarily those of the western pine beetle (Dendroctonus brevicomis Lec.); (2) to locate the areas of epidemic infestation warranting control measures; and (3) to define the type of trees and the areas susceptible to insect attack which should be considered in forest management plans.

Following the procedure of the past three summers, the 1939 surveys were divided into two parts: (A) Intensive cruises were made on four 320-acre check plots (see table 1) during the period July 31 to August 4, inclusive, by a three-man crew composed of R. M. Ramstad (leader), S. O. Norman, and E. B. Wycoff; and (B) extensive or observational surveys over most of the 271,000 acres of commercial pine of this forest were made by the writer on August 11 and 12, 1939. As a result of these combined surveys, estimates of the total 1938 losses for the forest as a whole were prepared.

Past Losses.

The past surveys and past pine-beetle losses on the Snoqualmie National Forest have been summarized in a previous report by the writer.¹ Pine-beetle losses on this forest have not been particularly heavy and have generally represented a normal endemic infestation. Except for 1932 and 1933—and probably for a year or two prior to 1932—the losses have been insignificant and have been approximately balanced by growth. Ponderosa pine mortality on the Tieton Plot—showing an average of 81 board feet per acre per year during the six-year period 1932 to 1937, inclusive—is probably indicative of the past rate of insect-caused depletion on this forest. The general trend of these losses has been downward from a peak in 1933 to a low in 1936, followed by a sharp increase in 1937.

Recent Losses.

Practically all of the recent, as well as past, ponderosa pine mortality on the Snoqualmie National Forest has been caused by the western pine beetle (Dendroctonus brevicomis Lec.). Minor and unimportant losses are occasioned by the mountain pine beetle (D. monticolae Hopk.) or by flatheaded woodborers.

¹ Whiteside, J. M.—report of pine-beetle surveys on the Snoqualmie National Forest, Wash., 1932-1938.—January 1939.

A summary of the recent check plot cruising data will be found in table 2. From this table it will be noted that the volume of pine killed in 1938 on the Soda Springs and Bald Mountain Plots increased very markedly over that recorded in 1937, while on the Tieton Plot a slight reduction was evident. The average 1938 losses on the three oldest plots are approximately 50 percent higher than in 1937.

The 1939 surveys were made at a time when approximately 27 percent of the year's probable losses were evident. Tentative estimates of the 1939 pine mortality, based on these uncompleted surveys, show a reduction of about 30 percent over that of 1938. In order to obtain data on insect activities in the excellent pine stands of Rattlesnake Creek drainage, a new check plot (Rattlesnake) was established and cruised by the 1939 crew. Neither the 1938 nor the tentative 1939 losses on this plot are serious, but are typical of the endemic condition found elsewhere in the forest.

Because of the endemic nature of the current infestation, no control measures were necessary and none were recommended.

Estimates of the total 1938 insect-caused depletion for this east-side portion of the Snoqualmie National Forest have been prepared. These have been based on the combined intensive and extensive surveys completed during the past summer. The estimates, by infestation areas, are presented in table 3. To show the comparative status of these losses and the general nature of the pine stands on this forest, map 1 has been included in the Appendix.

Significance of Pine-beetle Losses.

As shown in this report, pine-beetle depredations within and adjacent to the Snoqualmie National Forest have been continuous but not very serious. In spite of this condition, two important facts concerning these losses should be kept in mind. One fact is that pine-beetle losses—chiefly those caused by the western pine beetle—represent the second most important factor in the depletion of pine forests of the Pacific Northwest. Depletion from this source ranks next to, and in many years equals or surpasses, saw-log production. In privately owned stands adjacent to this forest saw-log production has been the greatest source of stand reduction; while on the forest proper, pine beetles have been most important.

The second fact is that plans for the control of the western pine beetle must be incorporated in any system of sustained production of ponderosa pine. Recent research by this laboratory has provided a method of identifying the type of trees likely to be killed by bark

beetles (Keen Tree Classification). The use of this classification in timber sales should result in a more nearly "bug-proof" stand for future cutting, and at the same time save this susceptible material by removing it before it is killed by beetles.

Recent insect surveys have failed to locate areas on the Snoqualmie National Forest needing immediate attention from a timber salvage standpoint. However, on present or contemplated sales, consideration should be given to the removal of all beetle-susceptible trees, as well as to any portion of the stand likely to represent a special hazard from insect epidemics.

Summary.

A brief review of past surveys and past losses, and the results of the 1939 surveys in the ponderosa pine stands of the Snoqualmie National Forest, Wash., are presented.

Practically all of the insect-caused ponderosa pine depletion in these stands is the result of the work of the western pine beetle. These losses have been continuous but not serious, and have represented a low endemic condition.

The general infestation trend has been downward from a peak in 1933 to a low in 1936, followed by a sharp increase in 1937 and 1938.

Estimated losses for 1939 are lower than those of the previous year. No control measures are necessary and none are recommended.

Table 1.—Description of Check Plots on the Snoqualmie National Forest, Washington.

Infestation Area and Unit	Check Plot				Elevation (feet)	Type	Site Quality	Acres	Ponderosa Pine Volume As of Jan. 1, 1938: Per Acre	Total Timbered (Mm)	(Bd. ft.)
<u>Naches</u>											
Wenatchee	Bald Mt.	17N	16E	29E/2	3,000 to 4,000	20.5 (5 $\frac{1}{2}$)	IV	320	300	2,531	8.5
Naches	Rattlesnake	15N	14E	16S/2	3,600	20.5	IV+	320	300	4,695	15.6
Tieton	Tieton	14N	14E	34E/2	3,000 to 3,800	20.5	IV	320	305	5,106	16.8
<u>Toppenish</u>											
Abraham	Soda Springs	12N	14E	12E/2	3,000 to 4,800	20.5 (5 $\frac{1}{2}$)	V	320	290	2,725	9.4

Table 2.—Summary of Recent Check Plot Cruising Data and Ponderosa Pine Losses, Snoqualmie National Forest, Washington

Check Plots	1937 Losses						1938 Losses						1939 Losses (Tentative)					
	Trees		Volume		Per: %		Trees		Volume		Per: %		Trees		Volume		Stand % Stand	
	Total	Acre	Total	Acre	Per:	%	Total	Acre	Total	Acre	Per:	%	Total	Acre	Total	Acre	Stand	
	Total	Acre	Stand: '37 to '36	Total	Acre	Stand: '38 to '37	Total	Acre	Total	Acre	Stand: '39 to '38	Stand	Total	Acre	Total	Acre	Stand	
Gold Mt.	7	.023	1,980	7	.03	-	22	.073	16,250	34	.64	8.20	14	7,800	14	7,800	.31	
Hiaton	21	.069	26,430	87	.52	6.67	20	.066	18,320	60	.37	.69	27	14,100	27	14,100	.28	
Joda Springs	15	.052	4,850	17	.18	-	15	.052	14,070	49	.52	2.90	16	14,700	16	14,700	.54	
Total (3 plots)	43	.048	32,260	36	.31	-	57	.064	48,640	54	.52	1.51	57	36,600	57	36,600	.35	
Rattle- snake							15	.050	8,820	29	.19	-	18	13,400	18	13,400	.29	
Total							72	.060	57,440	48	.38	-	75	50,000	75	50,000	.33	

Table 3.—Estimated Recent Ponderosa Pine Mortality by Infestation Areas, Snoqualmie National Forest, Washington

Infestation Area	Year of Loss	Mature Ponderosa Pine			Losses			
		Year	Volume of Acres	Volume (Mbm)	Trees	Per Total Acre	Total (Mbm)	Volume (Bd. ft.)
		1937	233,200	1,683,200	5,900	.025	6,500	28
	1938	233,200	1,676,700	9,000	.039	6,200	27	.37
Toppenish (Ahtanum Unit)	1937	38,000	294,000	3,300	.087	1,000	26	.34
	1938	38,000	293,000	1,500	.039	1,700	45	.57
Forest Total	1937	271,200	1,977,200	9,200	.034	7,500	28	.38
	1938	271,200	1,969,700	10,500	.039	7,900	29	.40

1939 PINE BEETLE SURVEY OF PONDEROSA PINE
IN OREGON AND WASHINGTON

NACHES AND TOPPENISH INFESTATION AREAS

SNOQUALMIE NATIONAL FOREST, WASHINGTON

LEGEND

AREA BOUNDARIES

UNIT BOUNDARIES

1938 BEETLE LOSS

-  0-25 trees per section. Normal infestation. Roughly about 0 to 1/4 of one percent of stand volume.
-  25-50 trees per section. Normal infestation. 1/4 to 1/2 of one percent of stand volume.
-  50-100 trees per section. Light epidemic infestation. 1/2 to 1 percent of stand volume.
-  100-200 trees per section. Moderate epidemic infestation. 1 to 2 percent of stand volume.
-  200-400 trees per section. Heavy epidemic infestation. 2 to 4 percent of stand volume.
-  Over 400 trees per section. Very heavy epidemic infestation. Over 4 percent of stand volume.

PONDEROSA PINE TYPES

Solid colors. Stands containing more than 50% ponderosa pine and of average or better thrift and vigor. In these stands the western pine beetle is the chief tree-killing agent.

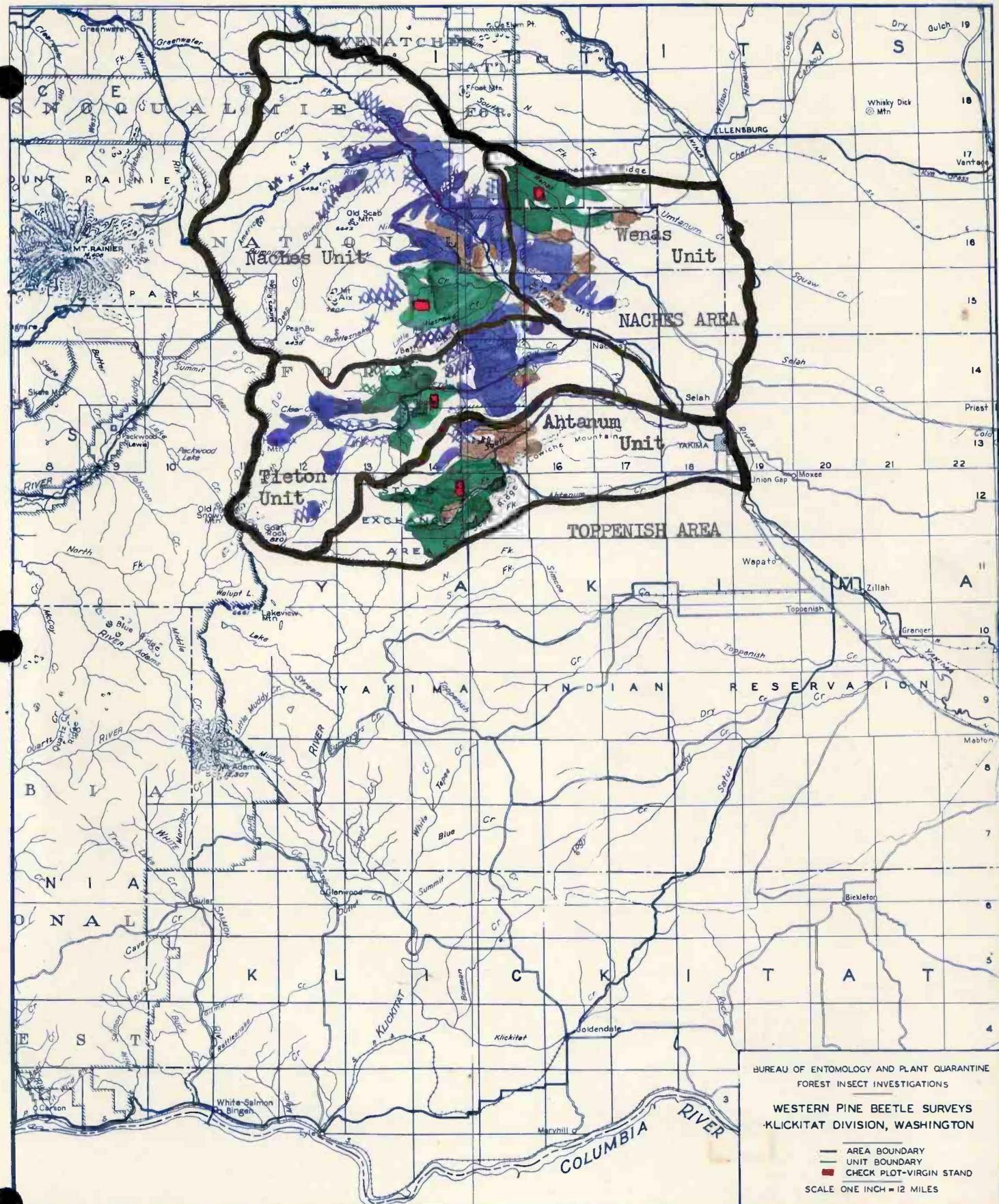
Cross-hatched colors. Stands containing from 20-50% ponderosa pine.

Dotted colors. Ponderosa pine stands of marginal or fringe type. In many of these areas drought as well as insects is an important tree-killing factor.



Cut-over areas.

U. S. BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE
U. S. FOREST SERVICE
Portland, Oregon



BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE
FOREST INSECT INVESTIGATIONS

WESTERN PINE BEETLE SURVEYS
KLICKITAT DIVISION WASHINGTON

— AREA BOUNDARY
— UNIT BOUNDARY
■ CHECK PLOT-VIRGIN STAND
SCALE ONE INCH = 12 MILES